MONTHLY WEATHER REVIEW.

Editor: Prof. CLEVELAND ABBE.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for August, 1898, is based on about 2,940 reports from stations occupied by regular and voluntary observers, classified as follows: 147 from Weather Bureau stations; numerous special river stations; 32 from post surgeons, received through the Surgeon General, United States Army; 2,583 from voluntary observers; 96 received through the Southern Pacific Railway Company; 29 from Life-Saving stations, received through the Superintendent United States Life-Saving Service; 31 from Canadian stations; 20 from Mexican stations; 7 from Jamaica, W. I. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Dr. Mariano Bárcena, Director of the Central Meteorological and Magnetic Observatory of Mexico; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; and Commander J. E. Craig, Hydrographer, United States Navy.

The REVIEW is prepared under the general editorial supervision of Prof. Cleveland Abbe.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to generally conform to the modern international system of standard meridians, one hour apart, beginning with Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local meridian is mentioned.

FORECASTS AND WARNINGS.

By Prof. F. H. BIGELOW, in charge of Forecast Division.

WIND SIGNALS.

No storm signals were ordered on the Pacific coast and the Great Lakes during August, 1898, and no severe wind storms appeared during the month in the West Indies or over the Caribbean Sea.

Two rather severe storms visited the southeastern coasts of the United States, one passing over western Florida the night of the 2–3d, and the other crossing the Georgia and southern South Carolina coasts the night of the 30th–31st.

The Florida storm first appeared as a feeble disturbance near Jupiter the night of the 1st, and passed thence northwestward to the vicinity of Tampa by the morning of the 2d. Anticipating a development of strength on the part of this disturbance information signals were ordered on the Florida, Alabama, and Louisiana coasts the morning of the 2d, and interests in those sections were telegraphed that "a storm appears to be developing in the east Gulf." That the signals and warnings were warranted and timely is shown by the following report of Mr. A. J. Mitchell, Observer and Section Director, Weather Bureau, Jacksonville, Fla.:

The storm approached the coast in the vicinity of St. Josephs Bay during the evening of the 2d. No marked premonition of an existing disturbance was observed during the early hours of the day. The wind velocity gradually increased from about 8 p. m. of the 2d and continued until 3 or 4 a. m. of the 3d. Near the coast the maximum wind was felt about 2 a. m. from the southeast. The storm track was about 60 miles wide and embraced mainly the section of country between the Choctawhatchee and Apalachicola rivers. Throughout this section great damage was done to crops, turpentine farms, and other property. Three barges, four tug boats, several pile drivers, and a number of sailing craft were sunk, and wharves and dwellings were damaged. The inland progress of the storm was characterized by diminishing force, and the disturbance was practically dissipated before it reached the Alabama line.

During August 27, 28, and 29, a feeble disturbance drifted eastward over the Gulf of Mexico, and on the morning of the 30th there were premonitory signs of a storm formation off the south Atlantic coast. The regular morning and special reports of the 30th located the point of the storm's inception off, and not far distant from, the Georgia coast; although these reports did not indicate the hurricane intensity of the storm over the very limited area it covered, northeast storm signals were ordered, and storm warnings were telegraphed to south Atlantic ports from Jacksonville, Fla., to Norfolk, Va., and the Chief of Bureau of Navigation, Navy Department, was notified of the threatening conditions in that section, during the afternoon of the 30th, twelve hours before the storm center reached the coast line. The greatest wind force was apparently experienced at Tybee Island, where a velocity of 84 miles per hour was recorded about 4:30 a. m. of the 31st. In addition to destruction and damage by wind heavy losses were caused by torrential rains and floods along the Georgia coast, and to river plantations between Augusta and Savannah. The territory ravaged by this storm was confined to Savannah and vicinity, and the following extract from the report of the observer at that point indicates the general

character of the storm. It will be observed that the lowest barometer reading, 29.23, occurred at 4:30 a. m., indicating that at that time the center of the storm passed over that city:

30th.—Wind fresh from north to northeast during the morning with a shower and slowly falling barometer; thunder, with very heavy rain in the afternoon, with a northeast wind squall of 34 miles per hour. As the afternoon advanced the general conditions became threatening and the wind began to show a backing tendency to the northwest. The barometer fell slowly during the evening until 10 p. m., when a very rapid decline began, with wind increasing from the northwest. At midnight the wind velocity had risen to 45 miles per hour from the northwest and the barometer had fallen to 29.73.

31st.—Until 3:30 a. m. the wind continued from the northwest increasing steadily in force, with squalls, steady rain, and rapidly falling barometer. At 3:30 a. m. a terrific wind squall occurred, during which a velocity of 76 miles per hour was recorded for five minutes with an extreme velocity (one mile) of 80 miles per hour. From that hour there was a slow but perceptible decrease in the wind force, although heavy gusts and squalls continued, and the barometer fell until 4:30 a. m. At 4:05 a. m. the wind shifted from northwest to west, to southeast at 5:40 a. m., and to south at 8 a. m., with rapidly rising barometer. During the nine hours ending 3 p. m. the rainfall amounted to 5.41 inches. Great damage was done to roofs, etc., the streets being littered with débris. The damage to shipping was considerable; lighters were blown ashore, dredges went adrift, and two barges were stranded on the river front; railroad roadbeds were washed out and telegraph and telephone lines were prostrated, leaving the city without communication. The estimated damage in the city of Savannah was $250,000, and rice plantations suffered to the extent of over $150,000.

The storm was not severely felt at Charleston, S. C., and did not extend to Jacksonville, Fla.

THUNDERSTORM FORECASTS.

The thunderstorms of the 15th, 16th, and 17th in the Chicago district were accurately forecast. They were particularly severe in the vicinity of Chicago, and the forecasts were strongly commended by the local press. Severe squalls occurred on Lake Michigan the night of the 24th, causing the capsizing of two schooners at Egg Harbor, Wis., and the foundering of two barges in tow near Muskegon, Mich. Sufficient warning of this storm was given by the Chicago office, the forecast sent to all Lake Michigan ports on the 23d being as follows:

Variable winds, shifting to fresh and brisk northerly; thunderstorms to-night.—*H. J. Cox, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURES.

During the month there were six highs and nine lows sufficiently well defined to be traced on Charts I and II. The principal points regarding their origin and disappearance, their duration, length of path, and velocity, will be found in the accompanying table. In making up the summary of lows No. IX was omitted as having too short and erratic a path to be considered in the monthly mean. In general the highs and lows of the month have been very indefinite and hard to follow on the weather maps. In Alberta and Assiniboia the reductions of barometer readings to sea level have been made by using the current temperature instead of the mean of a. m. and p. m. as in the United States. As a result of this there are very often fictitious highs in the morning and fictitious lows in the evening to the north of Montana. Some allowance has to be made for these conditions in tracing highs and lows.

Highs.—The general tendency of the highs has been to appear along the northern boundary of this country. Nos. I and IV could be traced from the Pacific coast. Nos. II, III, and VI began in the northwest, and V in the upper Mississippi Valley. Nos. I, II, and III disappeared off the north Atlantic coast, and V in the Middle Atlantic States, II off the south Atlantic coast, and IV in the lower St. Lawrence Valley.

Lows.—The lows of the month appeared to move along the northern boundary like the highs. Nos. III, V, VI, VII, and VIII began near the north Pacific coast. No. IV was first noted to the north of Montana, No. I in the middle Mississippi Valley, and IX was a tropical storm which was first noted off the north coast of Florida morning of 30th, and disappeared in Alabama p. m. of September 1. This last storm gave the highest winds of the month, 80 miles an hour at Savannah, Ga. A full account will be found elsewhere. On the 12th, as storm V was passing along the lower Lakes a most extraordinary rainfall was experienced at Washington City. The rain came in torrents all day long, and at 8 p. m. 4.92 inches had fallen in twelve hours. This storm was surprisingly local in its occurrence, and seems to have been central about 2.5 miles from the capitol. The distributing reservoir in Georgetown measured 5.93 inches on a. m. of 13th, and the second reservoir, about 4 miles beyond, measured 5.44 inches. Alexandria, Va., about 8 miles distant, had but 2.16 inches. It is probable the severe rain did not extend more than 6 miles across. Great Falls, 16 miles distant, measured only 0.93 inch total fall from a. m. of 12th till a. m. of 13th, and Kensington, 9 miles north, had but 1.87 inch. This was an example of a sporadic rain distinct from any low area or secondary formation, and presents a most interesting example for study.—*H. A. Hazen, Professor.*

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, a.m.	33	120	11, p.m.	45	58	5,260	10.5	504	21.0
II	2, p.m.	45	100	7, a.m.	34	77	1,880	4.5	407	17.0
III	9, a.m.	48	110	15, a.m.	42	66	2,940	6.0	490	20.4
IV	14, p.m.	47	128	19, a.m.	48	72	2,840	4.5	631	26.3
V	18, p.m.	43	90	20, p.m.	39	78	960	2.0	480	20.0
VI	25, a.m.	52	104	29, a.m.	45	61	2,280	4.0	570	23.7
Total							16,110	31.5	3,082	128.4
Mean of 6 paths							2,685		514	21.4
Mean of 31.5 days									511	21.3
Low areas.										
I	†30, p.m.	37	88	2, p.m.	45	60	1,560	3.0	520	21.7
II	1, p.m.	43	104	6, a.m.	51	61	2,400	4.5	533	22.2
III	1, p.m.	49	122	7, a.m.	33	97	2,640	5.5	480	20.0
IV	4, p.m.	54	106	9, p.m.	48	55	2,520	5.0	524	21.8
V	7, a.m.	46	126	13, p.m.	52	65	3,480	6.5	535	22.3
VI	11, p.m.	47	117	15, a.m.	44	83	1,710	3.5	489	20.4
VII	19, p.m.	53	116	27, a.m.	47	64	3,480	7.5	464	19.3
VIII	25, a.m.	52	126	29, p.m.	51	68	2,400	4.5	533	22.2
IX*	30, a.m.	30	80	‡1, p.m.	33	87	510	2.5	204	8.5
Total							20,190	40.0	4,078	169.9
Mean of 8 paths							2,524		510	21.3
Mean of 40 days									505	21.0

* Not included in final means. † July. ‡ September.

RIVERS AND FLOODS.

General, and in some instances abnormally heavy, rainfall over the drainage areas of the principal rivers kept all streams, except the upper and middle Mississippi and Missouri rivers, at stages in excess of the usual summer conditions, and as a result navigation and logging were successfully carried on during the entire month of August, 1898.

On the rivers of the Atlantic coast and Gulf States, and on the Ohio and Tennessee rivers, the high stages were very beneficial to river traffic, but were, on the other hand, detrimental to riparian owners, overflowing their lands and doing considerable damage to crops. In the Ohio River a moderate flood prevailed from the 6th to 13th, and although timely warnings were issued, which enabled merchants to save merchandise, farmers were unable to remove crops and